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Sewage Disposal in Camden County

What Homeowners Should Know

Forward

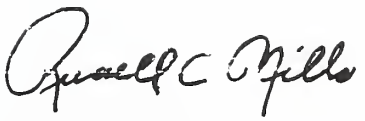
This publication was compiled for the Camden County Soil and Water Conservation District by the USDA Soil Conservation Service. The purpose is to provide general information about on-site sewage disposal to homeowners, planners and others. A brief discussion also is included about the installation and maintenance of various on-site sewage disposal systems.

This report contains general information that can be used during home design, and to help homeowners and other segments of the public understand on-site sewage disposal.

Before an educated decision can be made about what type of on-site sewage disposal system to install, it will be necessary for planners to know what type of soil is at a specific site. Soil information can be obtained from the Soil Conservation Service office in Camdenton.

Published soil surveys are available there that contain information about an area. But, because of the scale of mapping, individual soils in an area smaller than two or three acres cannot be shown. Thus, there may be small areas within the larger soil areas outlined in the survey that respond differently to on-site sewage disposal. For typical building lots, it would be wise to have an on-site evaluation of the soil and site conditions to verify the kind of soil present. Many private engineering firms provide this service.

The Soil Conservation Service wants to help you avoid on-site sewage disposal problems. Proper planning will save you the time, expense and inconveniences associated with improperly-installed or ill-advised on-site sewage disposal systems. And in so doing, we will be doing our job, which is to help you preserve the quality of Missouri's soil and water resources.



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Introduction

On-site sewage disposal systems treat and dispose of sewage on the same property as a residence. They adequately and efficiently should remove disease-causing pollutants and organisms (pathogens) from waste water before it enters ground and surface waters. And they should not cause odors or nuisances.

Septic tanks with leach fields are the most common on-site sewage disposal systems. These systems have been used for several decades in both rural and suburban areas.

Aeration tank systems have not been used in Camden County as long as septic tank systems. However, their numbers have increased in recent years.

On-site disposal has been identified as a significant water-quality issue in Camden County. It is difficult to isolate the full impact of improper home disposal of sewage on the water quality of the lake and rural communities. But, the number of on-site disposal systems in the county, along with local observations, provide evidence that it is a source that could affect water quality. Health related problems and aesthetic problems are associated with untreated or inadequately-treated effluent.

The operation and maintenance of a household sewage treatment and disposal system is the responsibility of the owner. The on-site disposal system can provide adequate and cost-effective removal of pollutants and harmful germs from household wastewater if the soil is favorable and the system is properly installed and maintained.

On-site sewage disposal systems popular in Camden County

The population of Camden County in 1980 was 20,017, an increase of about 50 percent from 1970. The Lake Ozarks Council of Local Governments projects a population of 32,000 by 1990, which would be an increase of 60 percent from 1980. Since building permits are not required, growth has been difficult to predict. But the annual increase in housing has been about 700 units. It is estimated that far more than 50 percent of homes in Camden County use on-site sewage disposal systems.

Camden County's on-site sewage disposal systems mostly are concentrated adjacent to the lake's shoreline, as well as in small communities and rural residences. Many of the homes adjacent to the lake are used seasonally, while those in and around communities primarily are occupied all year.

Septic tank systems have a long history

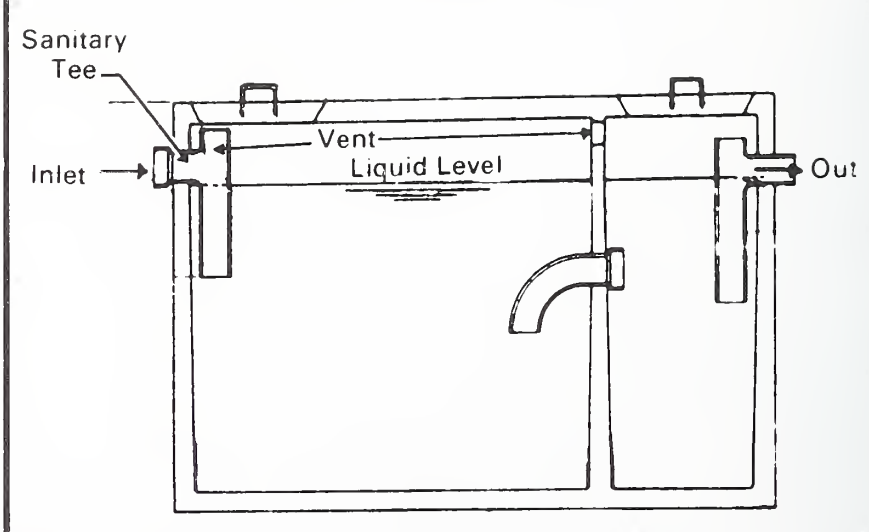
In Camden County, the majority of on-site disposal systems are septic tank absorption systems. These systems have been the least expensive and the most used since World War II.

The most common type of home septic system consists of two stages: the septic tank; and the leach field (sometimes called the soil absorption field).

The typical septic tank is a water-tight container with a capacity of 1,000 gallons or more. The main function of the tank is to provide a place for heavy solids (sludge) or light greases (scum) to separate from the liquid (see Figure 1). Typically, the liquid portion makes up about 75 percent of the tank's capacity. The remaining 25 percent is air, sludge and scum. Periodic checking and cleaning is necessary to ensure that solids do not build up and move into the leach lines.

The septic tank provides a place for anaerobic (non-air breathing) bacteria to break down solid material. This action reduces the solids by about 60 percent. The solids are retained in the tank by baffles. The effluent (liquid portion) flows out of the tank. The effluent contains disease-causing organisms and nutrients.

Figure 1
Typical Septic Tank



One of the major advantages of the septic tank is that it has no moving parts. However, periodic sludge removal will be necessary.

Aerobic tank systems rely on air

In aerobic tanks, unlike septic tanks, agitators or air pumps mix oxygen into the sewage to promote oxygen-using (aerobic) bacteria. Aerobic bacteria are more rapid decomposers than anaerobic (septic) bacteria.

Aerobic tank effluent, like septic tank effluent, contains disease-causing organisms and nutrients. Thus, aerobic tank effluent should not be discharged to the ground surface or into surface water.

Aerobic tank size is based on the amount of sewage that can be treated daily. Thus, for a given sewage flow, a smaller aerobic tank is needed than a septic tank. However, if the aerobic tank agitator or air compressor fails, the quality of effluent discharged from an aerobic tank will not be as good as that from an adequately-sized and maintained septic tank.

Soil is key to good leach field

The leach field is the second stage for purifying home waste. The liquid leaving the septic or aerated tank still contains harmful germs. It flows from the tank to perforated drain lines in the surrounding soil. In a properly functioning system, the solids stay in the tank to decompose. The liquid portion that enters the soil will be attacked by microorganisms that use it as a nutrient. This eventually destroys the germs.

If the system is designed and installed correctly, the effluent is carried through the drain lines to all points of the leach field, where it is absorbed and filtered by the surrounding soil.

The soil is capable of treating organic materials, inorganic substances and pathogens in the waste water. The soil acts as a filter, exchanger, absorber and an area where many chemical and biochemical processes may occur. The combination of these processes acting on the waste water as it passes through the soil produces a water of acceptable quality for discharge into the groundwater.

Numerous studies have shown that two feet to four feet of unsaturated soil is needed to remove bacteria and viruses to acceptable levels. The necessary depth is determined by the type of soil. If the soil is on steep slopes or areas that prevent water from soaking through the soil, unfiltered sewage may reach the surface.

Surfacing effluent attracts flies and other insects, and can be a source of disease. It also may be a source of unpleasant odors. If the soils are rocky or have a shallow depth to fractured bedrock, the sewage can reach groundwater untreated. It then is a source of contamination for wells and underground water supplies.

On-site sewage disposal systems can pollute water

On-site sewage disposal is a water quality item of major concern. Experience has shown that extensive use of individual home sewage systems in Camden County not only can result in water quality problems, but also can cause public health and nuisance concerns. Understanding how a system works and recognizing some potential problems are important for successful operation.

The causes of on-site sewage problems essentially are two-fold:

1. Physical Problems
2. Poor Management

Physical Problems

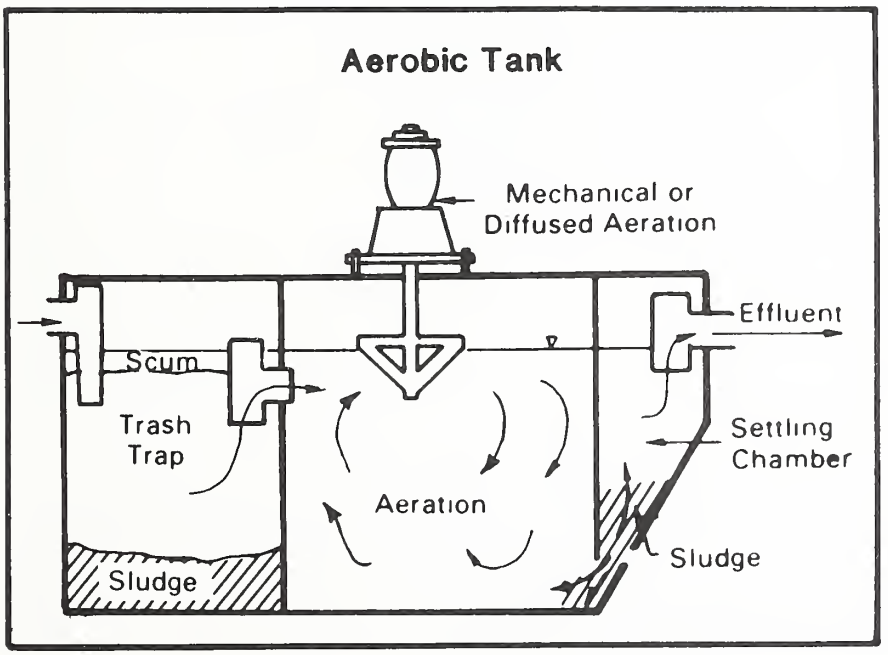
The performance of a septic tank or aerobic tank system is determined by soil conditions. If the soil type is unsatisfactory, the leach field will not function properly, no matter how well it is constructed. A system designed and installed properly in one location may not function in another. Failure of a waste disposal system is most common in the leach field.

Physical factors that affect the performance of septic and aerobic systems are:

A. Soil Permeability
B. Water Tables
C. Depth To Bedrock
D. Slope
E. Flooding

Soil Permeability

Soil permeability is the rate at which effluent percolates down



through the soil. When the leach field is constructed in soil that is too high in clay, or has a restrictive layer, the effluent will not percolate, and will remain near the surface. It may come to the surface. The reverse situation occurs when soil is high in sand and gravel. Then, the effluent percolates through the soil so rapidly that the effluent is not filtered, and may pollute the groundwater.

Information about the soils of Camden County can be obtained by contacting the Soil Conservation Service, the Camden County Soil and Water Conservation District or the University of Missouri Extension Service.

Soil map information can be used to predict the behavior of a sewage leach field with reasonable accuracy. The soil map is reliable for predicting the soil limitations of an area of several acres, but it may not contain enough detail to predict the limitations for a specific site.

Different kinds of soil can be located within short distances, and the soil maps are not detailed enough to determine precisely where a leach field should be located on a building site. Therefore, an on-site evaluation may be needed.

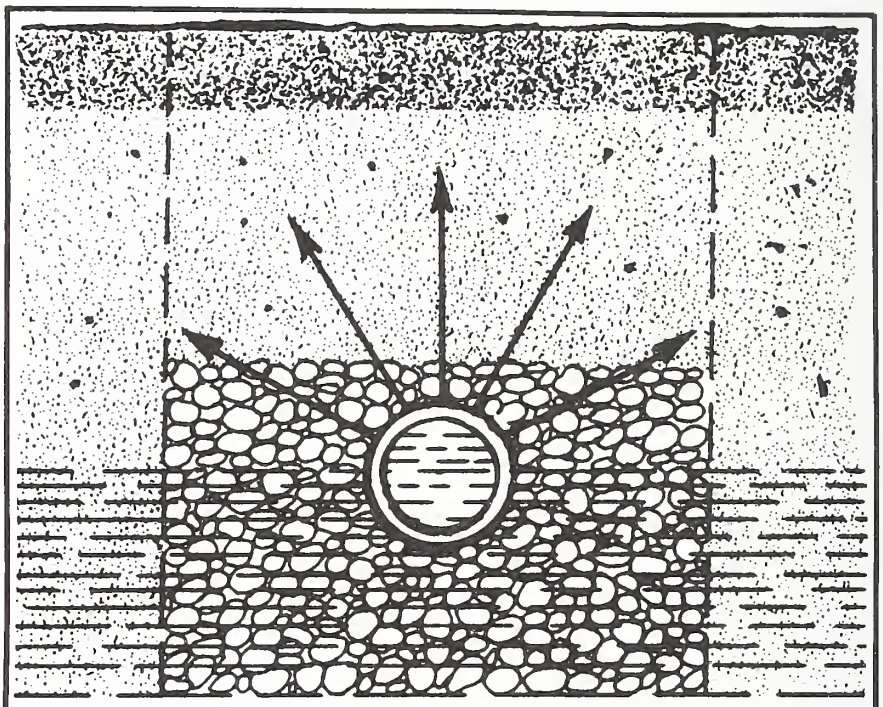
Water Tables

Some soils have high water tables during certain seasons of the year. This can cause a leach field to fail. These soils become saturated with water during wet weather, and some remain saturated for long periods after heavy rains. When this occurs, there is no space left for the effluent. If a soil has a very slow absorption rate, the effluent may rise to the surface even in dry weather. In wet weather, the leach field usually is a boggy mess.

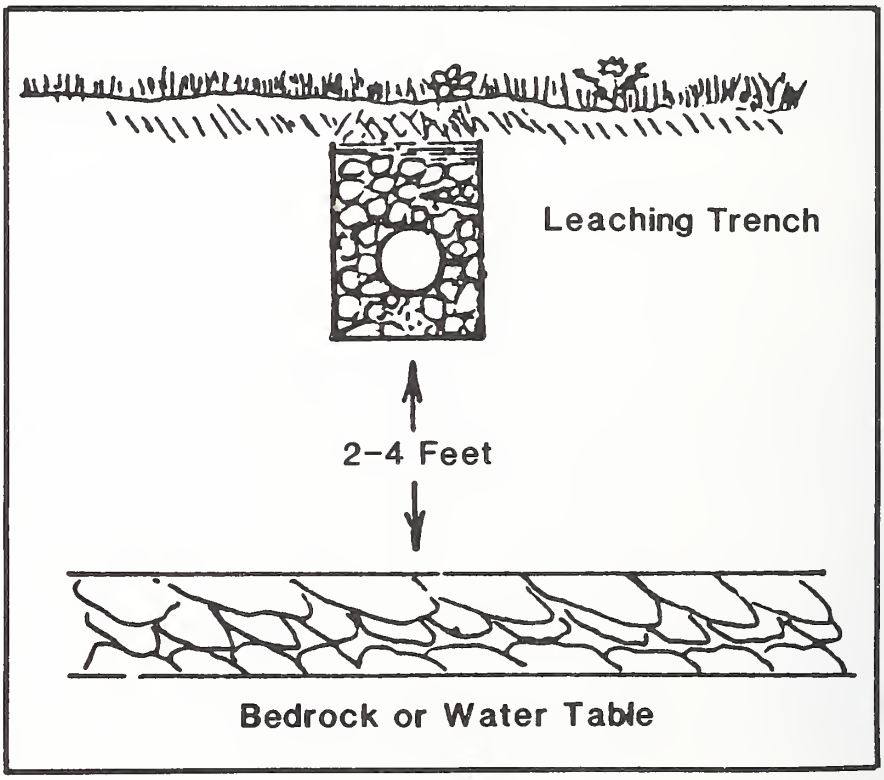
Depth To Bedrock

An adequate amount of soil is needed between the bottom of the lateral trenches and any rock formation to allow for absorption, filtration and purification of effluent. Inadequate depth of soil above the rock has the potential of producing back-up in the leach field as the effluent is deflected by the bedrock back to the surface.

In areas with crevices or channeled rock, there also is the potential for contamination of groundwater or wells.



The high water table at the tile level forces the effluent to the surface. This creates an unsanitary condition.



Excessive Slope

Areas with slopes greater than 15 percent make control of runoff difficult. Often the effluent flows down the slope to the surface of the hill too fast, before sufficient purification by the soil can be achieved.

On slopes, it is important that the trenches are dug on the contour so the effluent flows slowly through the tile, and disperses evenly throughout the leach field.

Flooding

Periodic or frequent flooding can create a problem for the system. When an area floods, it saturates the leach field and destroys the soil's ability to purify the effluent. When a leach field is flooded, the effluent flowing from the drain lines is forced upward to the surface. This creates a health hazard.

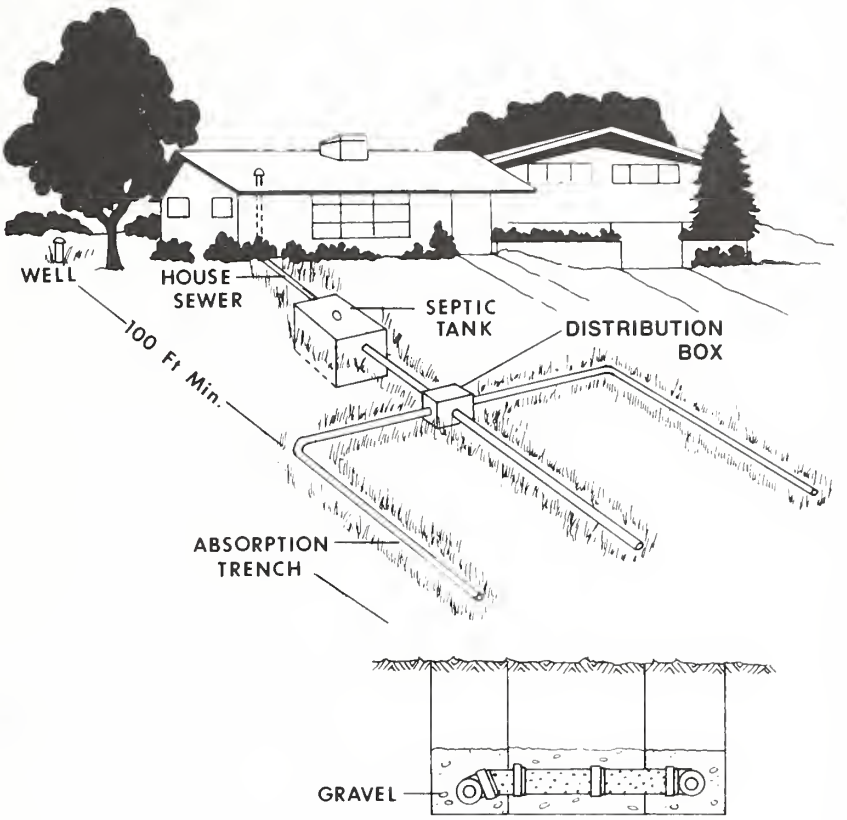
These are the major physical problems to consider when selecting a site for a septic or aerobic system in Camden County. It is important to acknowledge potential problems before and during construction of the system. Sewage often can be treated adequately and disposed of - even with problem soils - if systems are designed properly and installed carefully.

Management Concerns

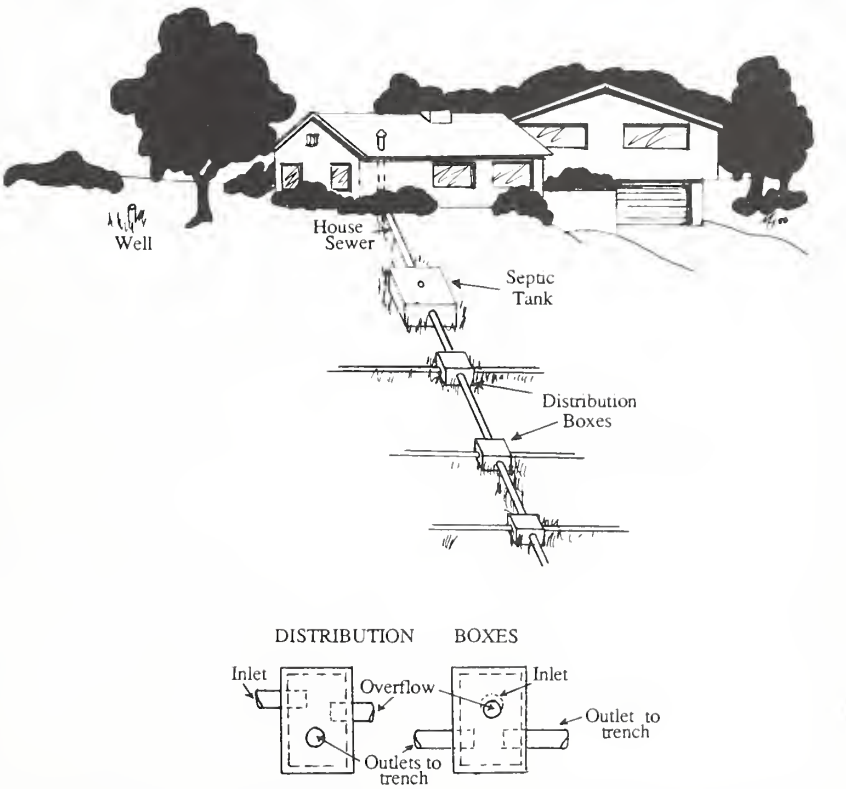
Septic tank and aeration tank systems pollute less if they are installed properly, inspected periodically and adequately maintained and operated. And when they fail, they must be repaired or replaced.

It is necessary to clean the tank in all cases, without exception. This consists of pumping out the solid contents of the tank. Therefore, it is important that tanks have an access port at the ground surface. Tanks should be cleaned when the total depth of sludge and scum exceeds one-half the capacity of the tank.

When the tank is neglected, it



Typical septic tank system on level ground



In constructing a sewage disposal system on sloping land, the tile lines for the absorption field are laid on the contour.

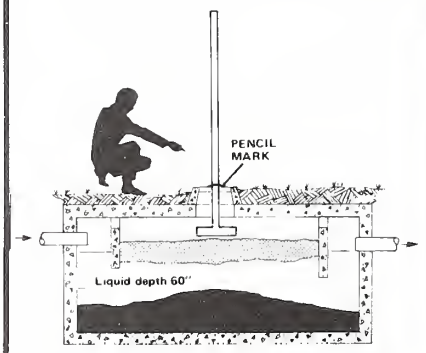
eventually will fill with solids, and some of these solids will flow out into the leach field. Then, it is only a matter of time until the flow of liquid is stopped. Uncovering, cleaning and replacing the drain pipes in a leach field is very expensive when compared to the low cost of proper tank maintenance. If cleaning is necessary, check the local telephone directory or ask the health department to recommend someone who does this type of work.

Sludge sticking to the sides of the tank after it has just been cleaned will have a seeding effect, aiding the renewal of bacterial action. Septic tanks, therefore, should never be scrubbed clean.

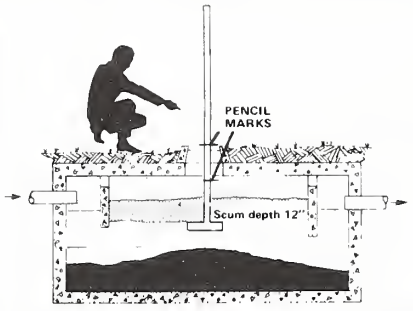
Detection of system failures is another aspect of the problem associated with on-site systems. Although the average dwelling has a life of about 80 years, the useful life of a leach field is about 10 years, and the maximum life is about 20 years. The primary cause of the short lifespan is soil clogging, which eliminates the natural treatment process. As a result, owners must determine the lifespan of their individual systems.

Malfunction of a system is often difficult to detect because clogging and leakage are not always visible. The leakage also may be beyond the system owner's property line.

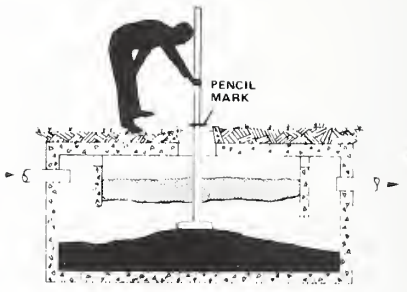
How to determine if a septic tank needs cleaning



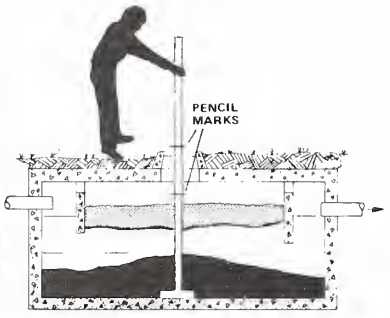
1. **Measure the amount of scum in the tank: Lower the bottom of the board to the top of the mat of scum, and mark the stick at the top of the tank opening.**



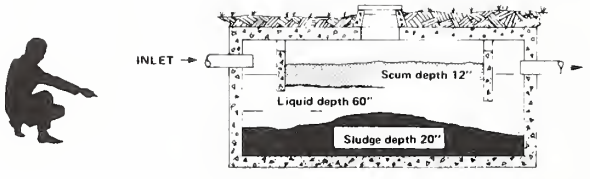
2. **Force the board all the way through the mat, and bring it back until you feel the bottom of the mat. Mark the mat again. The distance between these two marks is the scum depth.**



3. **Measure the depth of liquid and the depth of sludge: Let the stick drop until you feel resistance, and mark the stick.**



4. **Force the board all the way through the sludge to the bottom of the tank, and mark the stick again. The distance between these two marks is the sludge depth. If you do not know the maximum available liquid depth for your tank, you can find out now by measuring from the bottom of the board to the wet line on the stick.**



5. **Add the scum and sludge depths. If this figure is more than half the liquid depth, clean the tank.**

The maximum available liquid depth in this example is 60 inches. The scum depth is 12 inches and the sludge depth is 20 inches - a total of 32 inches. Since this is more than half of the maximum liquid depth, this tank should be cleaned.

Maintaining Sewage Disposal Systems is Important

There are things owners of on-site sewage disposal systems can do - both inside and outside the home - to ensure that their systems will function properly. Some suggestions follow.

Outside The Home

1. Make certain that rainwater is not entering the system. Rainwater does not need to be treated. Its volume is much greater than household wastewater.
2. Disconnect your heat pump, if you have one. This cooling water should not be connected to the septic system.
3. Check level of sludge in septic tank. See Page 6 for step-by-step directions.
4. If the septic tank must be pumped out, write down the date and put the information with your household records. Some tanks need pumping out every year. It depends upon the number of persons in your family and the amount of household wastewater generated.
5. Keep the septic tank leach field free of obstructions. Never build any type of structure over the system, or drive over it with heavy equipment, such as cars, trucks, farm equipment, etc. Damage can be caused to the trenches, tiles, or the tanks.
6. Never plant a garden over the leach field.
7. Keep the manhole cover easily accessible. Since the tank will need to be pumped out periodically, the cover should be in the clear. The cover should be locked or of sufficient weight to prevent a child from lifting it. As a safety precaution, the manhole cover should be no more than 12 inches wide. No one should ever go into a septic tank because deadly gases can build up inside the tank.

Inside The Home

Care of on-site waste disposal systems also is necessary inside the home. Household habits are important. The primary sources of wastewater generation in the home are the bathroom, laundry facilities and the kitchen. Water usage can be reduced 30 to 50 percent by installing a few simple, flow-reducing devices. These reductions have little or no effect on the lifestyle of the homeowner.

The following is a list of things homeowners and tenants can do to improve the life and efficiency of their home, sewage-disposal systems:

1. Reduce water usage. Less water used in the home means less water needs to be disposed of through the leach field.
2. Repair leaking faucets.
3. Minimize toilet flushing. Each flush uses five to eight gallons of water. Consider using a device to displace some of the water, such as a water-filled plastic bottle. Plumbing supply shops have other water savings devices. Consider buying one of the new, smaller-tank toilets. There are some that use as little as a few quarts of water per flush.
4. Take shorter showers. Regular shower heads use up to 60 gallons of water during a 10-minute shower. A low-flow shower head uses only 25 gallons or less of water for the same length shower. The low-flow shower head also saves fuel because less water needs to be heated. Low-flow shower

heads can save up to 10,000 gallons of water per year.

5. Use faucet aerators in kitchen sinks and lavatory bowls. They use about 50 percent less water. They are available in local plumbing supply shops.
6. Use suds-saver options in washing machines. These can save 20 gallons of water or more each week. And, only wash clothes when you have a full washer load.
7. Use automatic dishwashers wisely. Do small numbers of dishes by hand, or wait until the dishwasher is filled with dishes before running it.
8. Never put grease, solvents, paints, caustic or oily liquids, kerosene, gasoline, motor oil or cooking fats into any drain or toilet. These items tend to disrupt the biological processes in the septic tank.
9. Coffee grounds, bones, filter cigarette butts, disposable diapers, paper towels, tissues or plastic do not belong in any drain or toilet. They can cause a blockage in the system. Moderate use of bleaches, cleansers, and other household cleaning products will not harm your home septic system. It is recommended that white toilet tissue be used because it has no dyes that would need to be broken down in the septic tank. Many toilet tissue manufacturers indicate "Approved for Septic Tank Use" on their labels.
10. Do not connect sump pumps that collect foundation water to the sewage system. Direct that water onto ground surfaces or from the sewage system. If a sump pump is used for laundry waste, it must be separate from foundation drainage and connected to the sewage system. Most newer washing machines will pump at least four feet above the machine, making connection to the household drainage system possible.

Sources of Information

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Town and Country Sewage Treatment, North Central Regional Extension Publication 130, Revised 1981

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